## REMARKS

Reconsideration and withdrawal of the rejections of the claimed invention is respectfully requested in view of the amendments, remarks and enclosures herewith, which place the application in condition for allowance.

### I. STATUS OF CLAIMS AND FORMAL MATTERS

Claims 14, 15 and 17-32 are pending in this application. New claims 31 and 32 have been added to separate the herbicides previously encompassed by old claims 29 and 30. No new matter has been added by this amendment.

It is submitted that the claims, herewith and as originally presented, are patentably distinct over the prior art cited in the Office Action, and that these claims were in full compliance with the requirements of 35 U.S.C. § 112. The amendments of the claims, as presented herein, are not made for purposes of patentability within the meaning of 35 U.S.C. §§§§ 101, 102, 103 or 112. Rather, these amendments and additions are made simply for clarification and to round out the scope of protection to which Applicants are entitled.

### II. THE 35 U.S.C. 112, 1st PARAGRAPH REJECTION HAS BEEN OVERCOME

Claims 14, 15, 17 and 19-30 were rejected as allegedly lacking adequate written description. The applicants request reconsideration of this rejection for the following reasons.

The phrase "which are foliar-acting and substantially taken up by the green parts of the plants only" in claims 14 and 17 has been deleted as this phrase evidently did not assist the Examiner in understanding the herbicidal technology of the present invention. The applicants will again attempt to explain the distinction between the present invention and the cited references in the 102(b) and 103(a) rejections below.

With regard to the compound "silicon dioxide", this is the generic name for Sipernate 22S (see the "Additives" section of Table 3 from the specification – the applicants had submitted a declaration by Dr. Udo Bickers which presented comparative data for examples no. 46 and 47 in Table 3). A copy of the data sheet for Sipernate 22S which confirms this is silicon dioxide is attached to this response (see http://www.jefo.ca/fiches_anglais/sipernat_22s.html).

### III. THE 35 U.S.C. 102(b) REJECTION HAS BEEN OVERCOME

Claims 14, 15, 17-20, 22, 24, 27, 29 and 30 were rejected as allegedly being anticipated by Narayanan et al. (U.S. Patent 5,231,070 – "Narayanan").

Claims 14, 15, 17, 19, 20, 22, 24, 27, 29 and 30 were rejected as allegedly being anticipated by Sanders (U.S. Patent 5,635,447). Reconsideration of these rejections is requested for the reasons which follow below.

***Introduction***

In order to establish anticipation, every element of the applicants' claimed invention must be found in the cited reference and must be shown in as complete detail as is contained in the applicants' claim. *See MPEP 2131.* The applicants maintain the positions previously presented in their earlier responses, but after six (6) office actions, three (3) advisory actions and one (1) Examiner's Answer, it is apparent from the file history that either the nature of the applicants' invention has been lost or that there was never a complete understanding of the herbicidal technology in the first place. The applicants will now attempt to reset the discussion which should be help clarify the issues for Appeal should the rejection be maintained.

***Pre-emergence vs. Post-emergence***

The nature of the invention centers around controlling the growth of undesirable harmful plants ***pre-emergently*** with a ***post-emergence*** herbicide.

The terms "pre-emergent" and "post-emergent" are not terms which have been created by the applicants but are terms which have a distinct meaning to those of ordinary skill in the agrochemical arts. A representative meaning of these terms is provided from the website of the Biological and Agricultural Engineering department of the North Carolina State University ("Postemergence Herbicides" – http://www.bae.ncsu.edu/programs/extension/ag-env/nursery/postemergence.html - hereafter the "State article").

The State article teaches that pre-emergent herbicides are applied ***before*** the weeds emerge and are active in the soil and prevent the weeds from emerging.

In contrast, a post-emergent herbicide will only be active ***after*** the weeds emerge, i.e. the mechanism for action of the post-emergent herbicide relies on the infrastructure of the weed, e.g. uptake through the roots or direct contact on the weed such as on the leaves. Obviously, one problem with post-emergent herbicides is that they would ineffective if the weed has not yet

emerged. In addition, certain post-emergent herbicides such as glyphosate and glufosinate are so potent that not only do they kill the harmful plants but also kill the plant of interest.

Furthermore, to the extent that one of ordinary skill in the art would even think to use a post-emergent herbicide in a pre-emergent manner, the state of the art actively taught against such a usage.

For example, glufosinate-ammonium (2-amino-4-(hydroxymethylphosphinyl)butanoic acid), for example, which can be used as herbicide with foliar action is known to be *decomposed rapidly in the soil, so that it is not capable of displaying any herbicidal action* (G. Hoerlein in "Reviews of Environmental Contamination and Toxicology", vol. 138, Springer-Verlag; "The Pesticide Manual", 11th Edition, 1997, British Crop Protection Council) and the herbicide glyphosate (N-(phosphonomethyl)glycine), which likewise has foliar action, is known to be adsorbed strongly by the soil *and to be degraded therein, so that it is not available to the plant in sufficient amounts* (L. Torstensson in "The Herbicide Glyphosate", Butterworths, pp. 137-150). As further evidence, the applicants provide the following references in an IDS which accompanies this response:

(1) "Detoxification of glyphosate in soil", N. T. L. Tortenson, Weed Research, 1977, vol 17, 209-212;

- "*When the chemical comes in contact with soil it is rapidly inactivated.*"
[page 209 column 2]

(2) "Rapid inactivation of glyphosate in the soil", P. Sprankle et al., Weed Science, 1975, vol 23, 224-228;

- "*In summary, glyphosate was rapidly inactivated in the soil. Corn and soybean plants grown for 16 days absorbed only very small quantities from the soil. However, glyphosate could be absorbed by plants from nutrient solution. The rapid inactivation of large quantities of glyphosate by organic and mineral soils but not washed quartz sand indicated that the herbicide was adsorbed to the soil. Glyphosate adsorption to the soil was reversible with phosphate competing with glyphosate for binding sites. The initial step in the inactivation of glyphosate applied to the soil appears to be rapid binding to the soil and not microbial or chemical degradation.*'
[page 228 column left, last paragraph]

(3) "Adsorption, Mobility, and Microbial Degradation of Glyphosate in the Soil", P. Sprankle et al., Weed Science, 1975, vol 23, 229-234;

- "*Foliar applications of glyphosate at 1.12 to 4.48 kg/ha control many perennial weeds without causing injury to crops planted a few days after application. Although the herbicide is absorbed by wheat (Triticum aestivum L. 'Avon') from nutrient solution, crop plants do not readily absorb the herbicide from mineral soils. Soil applications of glyphosate at 56.0 kg/ha did not injure wheat plants grown in muck or clay soils. Glyphosate, a substituted glycine may be bound to soil in a manner similar to glycine and/or phosphate. ...*"

[page 229 column 1]

(4) "Metabolism and Degradation of Glyphosate in Soil and Water", M. L. Rueppel et al., J. Agrc. Food Chem.,vol 25 (1977), 517-526;

- "*Complete and rapid degradation of glyphosate .... (1) occurs in soil and/or water microbiologically and not by chemical action.*"

[page 517, summary, first sentence]

- "*The parent herbicide has also been shown to be stable to sunlight, nonleachable in soil, to have a low propensity for runoff, and to have a minimal effect on microflora*"

[page 517, summary, last sentence]

***Applicants' method claims are not anticipated***

Claims 14, 15, 18-23, 28, 29 and 31 are directed toward a ***method*** for controlling the growth of undesirable harmful plants ***pre-emergently*** with a ***post-emergence*** herbicide. As noted in the discussion above about the nature of pre-emergent and post-emergent herbicides, one of ordinary skill in the art would not have been directed to use a post-emergent herbicide in a pre-emergent manner.

With regard to Narayanan, the reference is quite clearly directed toward a method inhibiting leaching of active agrochemicals into the ground water and surrounding area of treatment (see e.g. the Abstract and col. 1, lines 5-10). There is no mention of the use of post-emergent agrochemicals in a pre-emergent manner nor is there any indication that this is an inherent property of Narayan's invention.

The passage in col. 2, lines 64-67 is representative of the teaching of Narayanan to only use herbicides in the manner which would be recognizable to one of ordinary skill in the art at the time the applicants' invention was made ("The above polymer/agrichemical (sic) composition is applied to the plant or surrounding soil area in a pre-emergent or post-emergent application and in an effective leach inhibiting, plant tolerating amount."), i.e. one of ordinary skill in the art would be directed toward the use of a pre-emergent herbicide in a pre-emergent manner or a post-emergent herbicide in a post-emergent manner NOT a ***post-emergent*** herbicide in a ***pre-emergent*** manner.

With regard to Sanders, the reference acknowledges that "[t]he present invention is premised upon the fact that…certain polymeric organic amino acids…can be used effectively in ***enhancing the penetration*** of herbicides such as urea herbicides ***through the exterior surface cells of the weed***." (see col. 2, lines 7-18 of Sanders). This is consistent with a ***post-emergent*** application, i.e. the weeds have already emerged, NOT a pre-emergent use.

The Examiner relies on a passage within Sanders to allege preemergent use, however, this fails to consider the entirety of the disclosure ("It may be used as a preemergent or postemergent application ***depending on the herbicide chosen***." – see col. 3, lines 16-18 of Sanders). As explained above, one of ordinary skill aware of the technology at the time the applicants invention was made would have used a pre-emergent herbicide for pre-emergent application.

For these reasons alone, the applicants' method claims are not anticipated by Narayanan or Sanders.

In addition, the applicants also note that the claimed methods also include a limitation on the scope of the carrier material and that further limitations are included with respect to dependent claims 15, 18-20, 22 and 29. As such, the applicant's invention also fails the other aspect for establishing anticipation, i.e. that the cited reference describe the applicants claimed invention in as complete a detail as in the applicants' claimed invention.

***Applicants' composition claims are not anticipated***

Claims 17, 24-27, 30 and 32 are directed toward compositions for controlling the growth of undesirable harmful plants ***pre-emergently*** with a ***post-emergence*** herbicide which contains a

post-emergence herbicide with a carrier material selected from the group consisting of fuller's earth, aerogels, high-molecular-weight polyglycols and polymers based on acrylic acid, methacrylic acid and copolymers thereof.

While the reasons for having all of the elements of the applicants' composition does not have to be the same as the reasons offered by the applicants, there still must be a showing that the combination of elements was in as complete detail as is contained in the applicants' claim. Naranayan and Sanders do not meet this requirement.

Narayanan clearly requires the presence of a crosslinked or non-crosslinked N-alkenyl lactam homopolymer in combination with an agrochemical in order to produce their leach inhibition; there is no requirement of the applicants' claimed carrier material as being a required element, i.e. one of ordinary skill in the art would not consider Narayanan as giving a detailed teaching of the combination of a post-emergent herbicide AND a carrier material of fuller's earth, aerogels, high-molecular-weight polyglycols and polymers based on acrylic acid, methacrylic acid or copolymers thereof especially when there is no indication this would have resulted in the leach inhibition required by Narayanan and in light of the narrow scope of post-emergent herbicides now claimed.

Likewise, Sanders' combination requires that any resulting combination in an improved absorption of an herbicide into a weed and as such Sanders does not provide the applicants invention in as detailed a description as is found in the applicants' claim.

## IV. THE 35 U.S.C. 103(a) REJECTION HAS BEEN OVERCOME

Claims 21, 23, 25, 26 and 28 were rejected as allegedly being obvious over Naranayan and Sanders further in view of Lovejoy (DE 2947073; 6/4/80) and The Agrochemicals Handbook, 3rd Edition A0810/ Aug 91 or A0310/ Aug 91. The applicants request reconsideration of this rejection for the following reasons.

As the applicants have established that neither Narayanan and Sanders anticipate the applicants' claimed invention, the arguments presented above also apply here as obviousness requires that all claim limitation are taught or suggested.

Neither Lovejoy or the Agrochemical Handbook remedy the deficiencies of Narayanan or Sanders and are not effective references for addressing the deficiencies which were

acknowledged in the Office Action, i.e. failure to teach silicon dioxide and the use of glufosinate and/or paraquat.

When making a determination of obviousness, both the applicants' claimed invention and the cited references must be considered as a whole.

Lovejoy[1] is clearly not directed to the specific teaching proffered in the Office Action as being directed to the use of silicon dioxide, i.e. Lovejoy is directed to the stabilization of an herbicide in finely divided form (i.e. solid) by using a dinitroaniline compound and a silica derivative. There was no reasonable expectation of success that an isolated element from Lovejoy could be extracted from the reference and inserted into the composition of Naranayan or Sanders which are directed to different inventions (solid vs. liquid compositions) with different purposes (stabilization vs. inhibiting leaching of agrochemicals into ground water or enhancement of herbicide absorption).

Likewise, the Agrochemical Handbook is merely a compendium of agrochemicals and when considered as a whole, there is no reason why one of ordinary skill in the art would have been directed to the teaching of glufosinate and/or paraquat (i.e. why not one the thousands of other agrochemicals which are listed in the handbook?)

Furthermore, determinations of obviousness also require consideration of secondary considerations. As noted above, the state of the art was such that one of ordinary skill in the art would not have expected a post-emergent herbicide to be effective in a pre-emergent capacity. As such, the data provided in the specification (see pages 15-18) and by Dr. Udo Bickers in the declaration filed is surprising that ANY pre-emergent activity was observed, i.e. one of ordinary skill in the art would have expected to see no pre-emergent activity as was disclosed by Dr. Bickers in Table A, B and C of his declaration for compositions outside the scope of the claimed invention.

The results in the specification and declaration are even more surprising in that not only was pre-emergent activity observed, but little to no damage was observed for useful plants (see e.g. Table 5 from the specification where there was no effect on HORVS (barley)).

[1] GB 2037585 appears to be an English language equivalent of DE 2947073.

## CONCLUSION

In view of the remarks and amendments herewith, the application is believed to be in condition for allowance. Favorable reconsideration of the application and prompt issuance of a Notice of Allowance are earnestly solicited. The undersigned looks forward to hearing favorably from the Examiner at an early date, and, the Examiner is invited to telephonically contact the undersigned to advance prosecution.

Respectfully submitted,
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## Guidelines for using postemergence herbicides

Most preemergence herbicides can be used after the soil is settled around the transplants and are applied before weeds emerge. This prevents weed seeds from germinating from several weeks to months. As with any other tool, each herbicide has unique characteristics which should be considered when planning a weed management program:

- Rate of application (the correct rate will vary with weed pressure, organic matter content of the soil, and ornamental species)
- Residual (length of time the herbicide will provide effective weed control)
- Activation (For maximum effectiveness, each herbicide needs to be watered [1/2-inch irrigation or rain] into the soil surface within a specified number of days.)
- Mechanism of action (how the herbicide kills weeds)
- Weed control spectrum (which weeds the herbicide will and will not control)
- Potential losses (leaching, runoff, and volatility)

Since preemergence herbicides will not control emerged weeds, they should be applied before weeds germinate. In field production, preemergence herbicides should be applied after transplanting to weed-free soil then irrigated. Frequency of herbicide application will depend upon the herbicide's residual. Residual weed control will increase with increasing herbicide application rate; control decreases with increasing amounts of rainfall or irrigation, temperature, and organic matter. The proper herbicide for each situation will be dictated by the plant species, weed species, and future use of the field.

Postemergence herbicides are applied to weeds after they have emerged. Characteristics of postemergence herbicides that should be considered before selection and use are:

- Systemic versus contact
- Selective versus nonselective
- Drying time
- Timing
- Mechanism of action
- Persistence
- Potential losses (leaching, runoff, and volatility)

Postemergence herbicides can be classified as systemic or contact and selective or nonselective. Systemic herbicides are absorbed and move through the plant. These are useful for controlling perennial weeds. For best control, the weeds must be actively growing so the

herbicides can move throughout the plant. Contact herbicides such as diquat dibromide (Reward) and paraquat (Gramoxone Estra) kill only the portion of the plant that is actually contacted by the herbicide. Contact-type herbicides control small annual weeds but only burn-back perennial or large annual weeds. Good spray coverage is important. Selective herbicides only kill specific plants. For example, clethodim (Prism), fluazifop-P-butyl (Fusilade II), and sethoxydim (Vantage) are selective, systemic, postemergence herbicides which only kill grasses while leaving broadleaf weeds unharmed. Nonselective, systemic, postemergence herbicides such as glyphosate (Roundup and many other trade names) and glufosinate (Finale) have the potential to kill or injure any plant that it contacts.

All postemergence herbicides have a specified drying time ranging from 30 minutes to 8 hours for maximum effectiveness. This is the length of time that needs to pass after herbicide application before irrigation or rain to ensure that the herbicide has had adequate time to affect the plant. Although postemergence herbicides labeled for field production remain in the soil for a short length of time after application, they have no residual and little or no soil activity; therefore, multiple applications are needed for perennial weeds. The majority of herbicides registered for postemergence weed control in field production are used either for grass control or for nonselective weed control. Products that provide nonselective weed control should not be applied to the foliage of ornamental plants as severe injury or plant death may occur.

Herbicides can not always be used, nor are they effective in controlling all weeds. In these situations, cultivation and hand pulling may be the only available options. Cultivation works well on small annual weeds; perennials will often regrow from the roots even if the top is removed. Also, remember cultivation can stimulate successive flushes of germinating weeds by bringing new weed seeds to the soil surface. You will need to check for emerging weeds on a two- to three-week cycle if you are routinely cultivating. If preemergence herbicides have been applied and activated, they form a herbicide barrier that must be left undisturbed to be effective. Cultivation disrupts this barrier and lessens the effectiveness of the herbicide. Therefore, cultivate sparingly if you use preemergence herbicide.

Cultivation is not without other drawbacks. Cultivated soil is very susceptible to erosion since there is little to no vegetation to hold the soil in place. In addition, implements such as in-row weeders, which cut off weeds 1 inch below the soil surface, can build up ridges, which are detrimental to growth of nursery crops. Ridged soil around the stem collar of newly set liners tends to suffocate them just as if they had been planted too deeply. Cultivating nursery stock in subsequent years causes considerable root pruning and delays growth, and can lead to a soil buildup around the collar of nursery stock. Many landscape contractors have had problems with trees grown with soil thrown over the surface of the roots. The surface of the root ball may have several inches of soil with few roots above what was the original soil line. Landscapers think they are planting at the correct height (Figure 5). In reality, they are planting several inches too deep. Thus, cultivation has received considerable attention in landscape magazines and has been identified as poor practice for growing nursery stock.

It is important to develop a weed management strategy that encompasses all 12 months of the year and uses all available options. These include preventative measures such as preemergence herbicides, as well as sanitary practices that prevent weed seeds and vegetative parts from spreading.

Field Maintenance References
Index

# FREE FLOWING AGENT
# SIPERNAT 22S "DEGUSSA"

**PHYSICAL DESCRIPTION:**

Appearance: hydrophilic loose white powder.
Odor: odorless.

**TYPICAL CHEMICAL ANALYSIS:**

| | | | |
|---|---|---|---|
| Drying loss | 6.00 % | $Al_2O_3$ | 0.20 % |
| Ignition loss | 5.00 % | $Na_2O$ | 1.00 % |
| Soluble salts | 1.80 % | $Fe_2O_3$ | 0.03 % |
| Chloride ions | 0.05 % | $SO_3$ | 0.80 % |
| Iron ions | 250.00 ppm | Sieve residue | 0.10 % |
| $SiO_2$ | 98.00 % | | |

**PRODUCT DESCRIPTION:**

Sipernat 22S (silicon dioxide) is obtained by grinding Sipernat 22, whereby a microfine silica is developed which is especially suitable as an anti-caking and dusting agent. Most of the particles of Sipernat 22S are less than 20 µm in size.
On the surface of these hydrophilic precipitated silicas there are free hydroxyl groups capable of interaction with suitable co-reactants.
It also serves to convert liquids of all types into powder form and acts as a carrier and a thickening agent.

**PHYSICAL PROPERTIES:**

| | | | |
|---|---|---|---|
| "BET" surface area | 190.0 $m^2/g$ | Density | 2.0 $g/cm^3$ |
| Average primary particle size | 18.0 nm | DBP Absorption | 270.0 g/100g |
| Average particle size | 7.0 µm | Specific gravity | 2.0 |
| Compacted apparent density | 120.0 g/l | Stability | good |

## CHEMICAL PROPERTIES:

pH value (4% aqueous suspension) 6.3

Melting point 1700.0°C

Solubility:

| | | | |
|---|---|---|---|
| In water | Insoluble | In hydrofluoric acid | Soluble |
| In ethanol | Insoluble | In alkali (80 - 100°C) | Soluble |

## RECOMMENDATIONS:

| APPLICATION | AMOUNT (%) | INCORPORATION |
|---|---|---|
| 1) Improvement in the free-flowing properties in mixers and in the storage stability. | 0.5 - 1.5 | Incorporate in powder mixers. |
| 2) Anticaking agent of milk extenders and fat concentrates. | 0.2 - 1.5 | Metered addition in powder form in the spay drier or into the finished product. |
| 3) Anticaking agent of powdered whey. | 0.5 - 2.0 | Metered addition in powder form in the spay drier or into the finished product. |
| 4) Anticaking agent of feedstuff urea. | 1.0 - 2.0 | Incorporate in powder mixers. |

The use of silicas in the animal feedstuffs industry is well established. They can help to obtain more economical and more efficient productions. Silicas can also act as carriers for fats, vitamin E, antioxidants and as free-flow and anticaking agents for minerals and salts.

## STORAGE:

Store in a cool and dry place with odorless conditions.

**PACKAGING:**

11.34 kg multiwall paper bags.

(08/2000)